

REMARKS/ARGUMENTS

The amendments and remarks hereto attend to all outstanding issues in the pending office action of 25 August 2003. Claims 1 - 20 remain pending in this application. Claims 1-5, 7-11, 13, and 15-20 stand rejected. Claims 6, 12, and 14 have been objected to as being dependent upon a rejected base claim; however, the Examiner has indicated that these claims would be allowable if rewritten in independent form including all of the limitations of the base claims and any intervening claims.

Applicant notes that the Office Action Summary indicates objection to, rather than rejection of claims 6, 12, and 14, in accord with the contents of the Examiner's paragraph "Allowable Subject Matter." However, the paragraph "Claim Rejections - 35 USC 102" includes the statement "Claims 1-20 are rejected under 35 U.S.C. §102(b)..." For purposes of this response, Applicant assumes that the statement "Claims 1-20 are rejected ..." is a typographical error, and that claims 6, 12, and 14 are not rejected under 35 U.S.C. §102(b).

Claims 1-5, 7-12, and 14-20 are amended as follows. Claims 1-5, 7-11, 13 and 15-19 are amended such that the terms "filament," "cathode," and "filament cathode" now read "filament-cathode," in order to maintain consistency and proper antecedent bases. Claims 1-3, 7-9, 13, and 17 are amended to properly introduce claim terms. Claims 3 and 14 are amended for clarity and consistency with preceding claims 2 and 6 and 12, respectively. Claim 20 is amended to maintain claim language of base claim 17.

No new matter is introduced through any of the claim amendments.

In the Specification

The first paragraph of the Detailed Description on page 6 and the second paragraph on page 8 of the specification are amended to correct typographical errors, including correction of the term "electrode mirror" to the intended term "mirror electrode," found throughout the specification.

The paragraph beginning on page 8 and concluding on page 9, and the paragraph beginning on page 9 and concluding on page 10, of the specification are amended to correct typographical errors and erroneous references to figures.

No new matter is introduced through any amendment to the specification.

Claim Rejections – 35 U.S.C. §102(b)

Claims 1-5, 7-11, 13, and 15-20 stand rejected as anticipated by U.S. Patent 4,684,848 ("Kaufman"). (Applicant assumes claims 6, 12, and 14 are not so rejected, as per the discussion under the first paragraph of "Remarks/Arguments.")

Applicant respectfully disagrees with the rejection of claims 1-5, 7-11, 13, and 15-20. The following is a quotation from the MPEP setting forth the standard for a holding of anticipation by a reference:

To anticipate a claim, the reference must teach every element of the claim and "the identical invention must be shown in as complete detail as contained in the ... claim." *MPEP 2131* citing *Verdegaal Bros. V. Union Oil Co. of California*, 814 F.2d 628, 2 USPQ2d 1051 (Fed. Cir. 1987) and *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913 (Fed. Cir. 1989).

Claim 1

Applicant's claim 1, as amended, describes a method for rapidly controlling the rate of ion generation in an ion source, including the steps of:

- supplying current to [a] filament-cathode;
- supplying current to [a] mirror electrode; and
- controlling the potential difference between a filament-cathode and the mirror electrode by modifying the potential of the mirror electrode to control the number of electrons available for ionization.

Kaufman does not teach each of the step limitations of Applicant's claim 1.

The Examiner states "Kaufman et al teaches an apparatus and method for controlling ion generation in an ion source (Col. 11 Lines 15-21) comprising a filament cathode (46), a mirror electrode (106)... and means (56, 94, 104, and 108)

for controlling the potentials of the filament-cathode, grid, and mirror electrode to control the electron population and ion generation (Col. 6 Line 47 through Col. 7 Line 60)." However, item 106 is not a "mirror electrode" in either of the passages cited by the Examiner; it is instead defined (Kaufman, col. 9, lines 40-55) as a "decelerator grid." There is therefore no teaching of a "mirror electrode" anywhere in Kaufman, nor does Kaufman teach anything similar to Applicant's mirror electrode. Further, Fig. 8 of Kaufman shows that "decelerator grid 106" is located outside of chamber 84. In the embodiment of Fig.2, "mirror electrode 130" is located within ion chamber 110.

Kaufman also does not teach "modifying the potential of a mirror electrode," as required by claim 1. Not only is a "mirror electrode" lacking in Kaufman, but the potential of Kaufman's "decelerator grid 106" is fixed by an "energizing power source" 108 (see Kaufman, Fig. 8). Kaufman does not teach or suggest that power source 108 is capable of "modifying the potential" of the "decelerator grid." Kaufman thus clearly does not teach "controlling the potential difference between said filament-cathode and said mirror electrode by modifying the potential of the mirror electrode" as required by claim 1.

Further, Kaufman fails to teach an "ion source being operable to generate an ion beam," as required by claim 1. Examiner states, "Kaufman et al teaches an apparatus and method for controlling ion generation in an ion source (Col. 11 Lines 15-21)." But this passage in Kaufman (taken in full context, col. 11 lines 13-21) states only "Now, what may be quite similar apparatus is used instead to generate a broad electron beam which not only has no problem with also developed ions but also even uses ions which are present to increase the stability and definition of the electron beam. Furthermore, the same plasma also may serve as a source of ions to be utilized either separately or in combination with the electron beam and also directed toward the same or a different target." This passage in Kaufman only provides a general indication that ions may "be utilized" or "directed," but provides no teaching about how either of these are to be done. For example, it teaches that "the same plasma also may serve as a source of ions" but does not indicate what "the same plasma" is. More importantly, Kaufman does not teach "a method for controlling ion generation" nor an "ion source operable to generate an ion beam," as required by claim 1. Kaufman does

not, therefore, "teach every element of the claim" or show "the identical invention ... in as complete detail as contained in the ... claim" as required under 35 U.S.C. §102(b).

For at least the reasons argued above, Kaufman does not anticipate Applicant's claim 1. Reconsideration and allowance of claim 1 are respectfully requested.

Claims 2-5

Claims 2-5 depend from claim 1, and thus benefit from like arguments. There are also additional reasons for allowability of these claims.

For example, amended claim 2 further limits the method of claim 1 by requiring "the step of reducing an ion beam intensity by driving the potential of the mirror electrode positive relative to the filament-cathode." As discussed above, Kaufman does not teach Applicant's "mirror electrode;" it therefore cannot also teach driving the potential of the electrode, as required in claim 2.

Similarly, amended claim 3 limits the method of claim 1 by requiring "the step of increasing an ion beam intensity by driving the potential of the mirror electrode negative ..." Again, since Kaufman does not teach Applicant's "mirror electrode," it cannot also teach driving such an electrode negative, as in claim 3.

Claims 4 and 5, as amended, include the limitations "wherein the filament-cathode is a..." directly heated filament-cathode, and indirectly heated filament-cathode, respectively. The Examiner states that Kaufman "teaches at Col. 7 Line 11 that directly or indirectly heated cathodes may be used." However, this particular line of Kaufman discusses "direct or alternating current." The full text of Kaufman's surrounding passage is: "The opposite ends of the cathode 46 are connected across energizing source 56 and that source may deliver either direct or alternating current. As before, other types of cathodes such as a hollow cathode which, during normal operation, may require no heating current, may be substituted." (col. 7, lines 9-14). Kaufman's description of electrical connections, type of current delivered, and discussion that a certain cathode type "may require no heating current" do not describe either a "directly heated filament-cathode" or an "indirectly heated filament-

cathode" as in claims 4 and 5, respectively. Applicant therefore contends that Kaufman does not teach or suggest directly heated or indirectly heated filament-cathodes, and that claims 4 and 5 are not anticipated under 35 U.S.C. §102(b).

For the reasons argued above, in addition to the dependence of claims 2-5 on claim 1, Applicant respectfully requests reconsideration and allowance of each of claims 2-5.

Claim 7

As amended, claim 7 recites "A method for rapidly controlling the rate of ion generation in an ion source having a filament-cathode, a mirror electrode, and at least one grid, the ion source being operable to generate an ion beam ..." and the step of "... controlling the potential difference between said filament-cathode and said grid by modifying the potential of the grid relative to the filament-cathode to control the number of electrons available for ionization..." As discussed with respect to claim 1, the Examiner states "Kaufman et al teaches an apparatus and method for controlling ion generation in an ion source (Col. 11 Lines 15-21)." Applicants find no teaching of a "method for controlling ion generation" nor "ion source operable to generate an ion beam" in this passage, or elsewhere within Kaufman.

Additionally, Kaufman's power supplies 56, 94, 104 appear to be fixed, and therefore cannot "modify" the potentials of screen grid 88 or accelerator grid 90 relative to filament cathode 46. Claim 7 further requires a "mirror electrode," which has been shown to be absent from Kaufman (as in claim 1, argued above).

As Kaufman fails to teach a "method for controlling ion generation," a "source operable to generate an ion beam," "modifying the potential of a grid relative to the filament-cathode," or a "mirror electrode" – among other reasons - Applicant respectfully requests withdrawal of the rejection of claim 7 under 35 U.S.C. §102(b) and solicits allowance of claim 7.

Claims 8-11

Since claims 8 – 11 depend from claim 7, they benefit from like arguments. However, there are additional reasons for allowability of each these claims, as detailed herein below.

Amended claim 8 further limits claim 7 by requiring "the step of reducing ... ion beam intensity by driving the potential of [a] grid positive relative to the filament-cathode..." As argued above, Kaufman fails to teach a step of reducing ion beam intensity by driving the potential of a grid; all of Kaufman's grids are shown connected with fixed power supplies. Kaufman further fails to teach an ion beam, as argued above. Kaufman also does not teach or suggest a mirror-electrode, as required in claim 8.

Conversely, amended claim 9 limits claim 7 by requiring "the step of increasing ... ion beam intensity by driving the potential of [a] grid negative relative to the filament-cathode..." As argued above, Kaufman fails to teach a step of increasing ion beam intensity by driving the potential of a grid; all of Kaufman's grids are shown connected with fixed power supplies. Kaufman further fails to teach an ion beam, and does not teach or suggest a mirror-electrode, as required in claim 9.

Amended claims 10 and 11 include the limitations of directly heated and indirectly heated filament-cathodes, respectively. Applicant contends, as discussed with respect to claims 4 and 5, that neither directly heated nor indirectly heated filament-cathodes are taught in Kaufman.

For the reasons argued above, in addition to the dependence of claims 8-11 on claim 7, Applicant respectfully requests reconsideration and allowance of each of claims 8-11.

Claim 13

As amended, claim 13 recites "An improved ion source apparatus for rapidly modulating the intensity of an ion beam" with "a mirror electrode having a potential therewith and located on the other side of said ion chamber, said mirror electrode being connected to a circuit to vary its potential relative to said filament-cathode..." As noted above, Kaufman's power supplies appear to be fixed. Kaufman also does not disclose generating an ion beam, and therefore Kaufman does not teach "rapidly modulating the intensity of an ion beam." Claim 13 also requires a "mirror electrode," which again is absent from Kaufman. Since Kaufman does not teach (1) "rapidly modulating the intensity of an ion beam"; (2) "a mirror electrode," or (3) "said mirror

electrode being connected to a circuit to vary its potential" as required in claim 13, Applicant respectfully requests withdrawal of the rejection of claim 13 under 35 U.S.C. §102(b).

Claims 15-16

Since claims 15 and 16 depend from claim 13, they benefit from like arguments. However, amended claims 15 and 16 also contain the limitations of directly heated and indirectly heated filament-cathodes, respectively. Applicant contends, as discussed with respect to claims 4 and 5, that neither directly heated nor indirectly heated filament-cathodes are taught in Kaufman.

For at least the reasons argued above, in addition to the dependence of claims 15 and 16 on claim 13, Applicant respectfully requests reconsideration and allowance of each of claims 15 and 16.

Claim 17

Amended claim 17 recites "An improved ion source apparatus for rapidly modulating the intensity of an ion beam" with "a mirror electrode located on the other side of said ion chamber" and "at least one grid being connected to a circuit to vary its potential relative to said filament-cathode and being operable so as to vary the number of electrons available in the ion chamber...." As noted above, Kaufman fails to teach generating an ion beam, and Kaufman's power supplies appear to be fixed such that they do not "modulate the intensity of an ion beam." Claim 17 also requires a "mirror electrode located on the other side of said ion chamber." Not only does Kaufman fail to teach Applicant's mirror electrode, Kaufman further fails to teach a mirror electrode "located on the other side of said ion chamber." Furthermore, Kaufman's grids do not "extend inside said ion chamber" (they are outside chamber 84, as seen in Kaufman's Fig. 8) or "connect to a circuit to vary its potential relative to said filament-cathode and being operable so as to vary the number of electrons available in the ion chamber for ionization," as required by claim 17. Being connected with fixed power supplies, Kaufman's grids are not "operable to vary" the number of electrons available in an ion chamber for ionization.

Since, among other reasons, Kaufman fails to teach a method to rapidly control ion generation, a source operable to generate an ion beam, a mirror electrode, location of the mirror electrode on the other side of an ion chamber, or circuitry connected to a grid rendering it "operable so as to vary the number of electrons available in the ion chamber for ionization," Applicant respectfully requests withdrawal of the rejection of claim 17 under 35 U.S.C. §102(b) and solicits allowance of the claim.

Claims 18-20

Since claims 18 - 20 depend from claim 17, they benefit from like arguments. Additional support for patentability of claims 18-20 is laid out herein below.

Amended claims 18 and 19 contain the limitations of directly heated and indirectly heated cathodes, respectively. Applicant contends, as discussed with respect to claims 4 and 5, that neither directly heated nor indirectly heated filament-cathodes are taught in Kaufman.

Claim 20 recites "said mirror electrode," which has been shown to be absent from Kaufman.

For at least the reasons argued above, in addition to the dependence of the above claims on claim 17, Applicant respectfully requests reconsideration and withdrawal of the rejection of claims 18 - 20 under 35 U.S.C. §102(b).

Allowable Subject Matter

Applicant thanks the Examiner for his indication of allowable subject matter in claims 6, 12, and 14.

In view of the above Amendments and Remarks, Applicant has addressed all issues raised in the Office Action dated 25 August 2003, and respectfully solicits a Notice of Allowance for each of claims 1-20. Should any issues remain, the Examiner is encouraged to telephone the undersigned attorney.

A Petition for Three Month's Extension of Time to Respond, along authorization to charge the required, small entity fee of \$475.00 to Deposit Account 12-0600, is submitted herewith. Applicant believes no further fees are due, however,

if any additional fee is deemed necessary in connection with this Amendment and Response, please charge Deposit Account No. 12-0600.

Respectfully submitted,

LATHROP & GAGE L.C.

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